Street Improvement Survey Guidelines

VERTICAL DATUM AND BENCHMARKS

Datum

The following vertical datum are used by the City of Seattle:

Contact: For more information, call (206) 684-5044.

1. **City of Seattle** Vertical Datum. This datum was used for all survey and construction work in the City of Seattle from 1892 to 1992. It was gradually phased out from 1993 to 2002 as the NAVD-88 datum was being phased in (See #2 below). This datum is currently used for reference purposes only. Descriptions and elevations of City of Seattle benchmarks may be obtained by consulting City of Seattle Survey field books, available to the public on the forty-seventh floor of Key Tower at 700 Fifth Avenue[1].
2. **NAVD-88** Vertical Datum (1988 North American Vertical Datum). Control reports of acceptable NAVD-88 city established benchmarks are available at www.surveycontrol.state.wa.us and at the Engineering Records Vault, on the 8th floor of the Municipal Building, 600 Fourth Avenue. Other 3rd-Order NAVD-88 benchmarks that have been recorded as a public record would also be acceptable.

Document Reference: You can verify NAVD-88 benchmarks, as well as survey procedures at the Web sites listed on this page.

Mandatory Vertical Datum

All survey and construction work performed within City of Seattle right-of-way from March 2002 forward shall be on the NAVD-88 datum.

SURVEY PROCEDURE

Project site benchmarks shall be established by measurement from *two local benchmarks* that are listed at http://www.surveycontrol.state.wa.us/, meeting Third Order procedural requirements, as specified Geospatial Positioning Accuracy Standards by the Federal Geographic Data Committee at http://www.fgdc.gov. A record of this field work shall be provided to Seattle Public Utilities in the form of a survey field book or an electronic file in ASCII, Microsoft Word, or Excel.

When reference is made to records/plans created using the City of Seattle datum[2], a local conversion factor between the City of Seattle datum and the NAVD-88 datum shall be established by differential leveling between benchmarks in each of the respective datum. A record of this fieldwork shall be provided to Seattle Public Utilities in the form of a survey field book or an electronic file in ASCII, Microsoft Word, or Excel.

[1] Although 0.0 City of Seattle datum is *approximately* equal to 9.7 NAVD-88, this difference should not be used as a means of establishing one datum from the other. The difference could vary as much as a foot from one part of Seattle to another!
[2] These records could include plan drawings, survey field notes and other records.

BENCHMARK DESCRIPTIONS

All plan drawings, survey field notes, and electronic files shall state which datum is being used and describe the benchmarks that were used.

- NAVD-88 benchmarks should list their benchmark number, Point Name (Designation)[3], elevation, and description.
- City of Seattle benchmarks should list City of Seattle field book number, page, elevation, and description.
- Local project benchmarks set by the consultant should list elevation and description.

SURVEY CONTENT OF CONSTRUCTION PLANS

The following is the minimum survey information required on any plans.

Horizontal Control

City of Seattle monuments shall be the basis of horizontal control. The plan shall show the monuments used, describing the type of monument (e.g., monument in case) and what it monuments (e.g., intersection with centerline of 4th Avenue). If a construction baseline is created, its positional relationship to the monuments must be clearly defined (i.e., dimensions or coordinates).

Document Reference: The City's Quarter Section maps are available in the Seattle Public Utilities Engineering Services Records Vault office on the 47th floor of Key Tower, 700 Fifth Avenue.

All improvements and rights-of-way shall be stationed and dimensioned from the monument lines or baselines as described above. Wherever possible, street stationing shall be the stationing established by the City of Seattle when the streets were originally surveyed. This stationing can generally be found in the City of Seattle survey field books, which are referenced on the City's Quarter Section maps, both of which are available to the public on the eighth floor of the Seattle Municipal Building at 600 Fourth Avenue.

Monument Replacement

Document Reference: Standard Specifications for Road, Bridge and Municipal Construction, 2000 Edition, Vol. 2, Sections 8-13.

- Any monuments that will be disturbed by construction must be noted on the plan as requiring replacement. The City of Seattle (Seattle Public Utilities, Engineering Dept., Survey Section) must be notified in sufficient time to reference the monument before it is disturbed. The City of Seattle will set all street monuments, whether they are replacements or new. For further details, see the Standard Specifications for Road, Bridge and Municipal Construction, 2000 Edition, Vol. 2, Sections 8-13.
- All horizontal curves shall be dimensioned with sufficient curve data to define their geometry (e.g., radius, curve length, delta, and PI or PC/PT stationing).

[3] When utilizing City of Seattle NAVD-88 benchmarks, reference the record by the "Point Name (Designation)" as listed on the data sheet (e.g., SNV-7508). For benchmarks from other sources, reference by the "Point ID (PID)" or equivalent.

Paving and Curbs

- Profiles shall be included for all street centerlines and curbs, including curb returns.
- Profiles shall show PVI station and elevation, length of vertical curve, and grade of tangents.

Storm Drain and Sewer

- Location for manholes shall be to the "control point" that defines the alignment of the pipe. If the center of the manhole is offset from this point, this should be dimensioned in a detail.
- Horizontal location of the control point for each manhole shall be shown in the plan view by station and out from the monument line (or baseline if that is used).
- Profiles shall show invert elevation and rim elevation for each manhole. Invert grades shall be shown for the control point. The profile distance along the pipe should match the distance between the control points.

CONSTRUCTION SURVEY DOCUMENTATION

The City of Seattle shall be provided with a record of construction points set. This record should include the following:

1. A sketch showing the relationship of the monuments, improvements and the offset points set. The sketch should show all relevant dimensions and stationing, following good survey note keeping practices.
2. A hard copy or electronic file in ASCII, Microsoft Word, or Excel showing the grades set for the improvement (i.e., "grade sheet").

COMMON ERRORS TO AVOID

The following common errors are unacceptable on any plans submitted to the City of Seattle.

Paving Design

- The submitted plans have proposed new curbs, with a narrow strip of new paving between the new curb and a saw cut in the existing paving. The plan calls for a cross-slope of 2% and provides a profile, which appears acceptable. However, because of insufficient analysis of existing paving, unacceptable cross-slopes can result. The design must accommodate existing conditions.

Simple Math Errors

- Calculated distances between manholes (control points) are incorrect.
- Calculated grades between manholes (control points) are incorrect.

Inconsistencies

- Information in plan view is inconsistent with that in profile view.
- Information is inconsistent across match lines.

OBTAINING SURVEY SERVICES

Private surveyors may be hired to perform land survey services for preliminary engineering and engineering design. The survey process and product must meet the established guidelines found in the Street Improvement Survey Guidelines section of this document.

In addition, during this designated test period, the engineer, developer, or contractor has the option of hiring private surveyors or City of Seattle surveyors to perform the construction staking and production of necessary grade sheets. Any survey work shall be done under the supervision of a licensed surveyor.

If the City of Seattle surveying unit is requested to perform the construction staking and grade, please coordinate the request through your Street Improvement Analyst to schedule the survey work.